

Claims

1. A method of determining the risk of ice deposition due to precipitation, wherein air temperature is measured and a type of precipitation and an amount of precipitation are estimated, **characterised in** that a measurement is performed for determining the actual amount of ice contained in the precipitation; and that the results from said measurements are combined for determining the risk of ice deposition.
- 5 10 2. A method according to claim 1, **characterised in** that the type of precipitation is estimated on the basis of a measurement for determining the ratio of liquid to frozen particles contained in the precipitation.
- 15 3. A method according to claim 1, **characterised in** that the measurement for determining the ratio of liquid to frozen particles is determined by an optical measurement known per se and subsequent calculation.
- 20 4. A method according to claim 1, **characterised in** that a measurement is performed for determining the total equivalent, liquid amount of precipitation.
5. A method according to claim 1, **characterised in** that the measurement for determining the actual amount of ice contained in the precipitation is performed as a calculation on the basis of dew point measurement.
- 25 6. A method according to claim 1 or 5, **characterised in** that the measurement for determining the actual amount of ice contained in the precipitation is performed as a measurement of actual ice formation.
- 30 7. A method according to claim 6, **characterised in** that the measurement comprises provision of a surface element that has a predetermined surface area and is, during a predetermined period of time, caused to move relative

to the atmospheric air, following which the amount of ice accumulated on the surface element during said period of time is measured.

8. A method according to claim 6, **characterised in** that the temperature of
5 the surface element is caused to correspond essentially to the temperature of
the atmosphere.

9. A method according to claim 6, **characterised in** that the temperature of
10 the surface is caused to have another predetermined temperature during said
period of time.

10. A method according to any one of claims 7-9, **characterised in** that, following measurement of the accumulated amount of ice, a relative movement is briefly provided between the surface element and the atmosphere at a rate
15 that considerably exceeds the rate prior to said measurement, following which a further measurement of deposited ice is performed.

11. A method according to any one of claims 7-10, **characterised in** that the relative rate between the surface element and the atmosphere is controlled
20 by controlling the rate of rotation of one or more rotatable surface elements.

12. A method according to claim 11, **characterised in** that the adhesive capacity of the ice is measured by measurement of the accumulated amount of ice following a number of rotations at mutually different rates.
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13. A method according to claim 11, **characterised in** that the air resistance between the atmosphere and the ice accumulated on the surface element is measured.

30 14. A method according to any one of claims 7-13, **characterised in** that anti-icing liquid is applied in a predetermined concentration and a predeter-

mined amount on the surface element before the measurements are performed.

15. A method according to any one of claims 1-14, and wherein a surface is
5 applied with a predetermined type and concentration of anti-icing liquid,
characterised in that the risk of ice deposition on the surface is calculated
on the basis of

- knowledge of the type and concentration of the anti-icing liquid;
- knowledge of the result of the measurement for determining the ratio
10 of liquid to solid particles contained in the precipitation; and
- knowledge of the result of the measurement for determining the current amount of ice contained in the precipitation.

16. A method according to claim 15, **characterised in** that the risk is calculated and shown as a holdover time.
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17. A method according to claim 15 and wherein manual tables are used to estimate holdover time, wherein the tables are grouped according to different types of precipitation, **characterised in** that the knowledge of the current
20 amount of ice contained in the precipitation and the ratio of the precipitation of solid to liquid particles is used for defining the type of precipitation.

18. A method according to claim 15, **characterised in** that the concentration and anti-icing liquid is determined as a function of holdover time and the
25 measured risk of ice deposition.

19. A method according to any one of claims 1-18, **characterised in** that an expert system is used for the calculations which is configured for being run on a computer and configured for being able to estimate the risk of ice deposition on the basis of measurements, and configured for receiving information about the actual amount of ice accumulated, and, on the basis of the differ-
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ence between the calculated and actual amount of ice, adjusting parameters in a calculation model for calculating the deposited amount of ice.

20. A method according to claim 19, **characterised in** that the computer is
5 caused to be in communicative connection with other computers that are located in geographically different places; and that the expert system is configured for calculating in advance future changes with regard to the risk of ice deposition in response to meteorological parameters entered therein.

10 21. An apparatus for exercising the method according to claim 1, **characterised in** that the apparatus comprises a combination of
- optical means for measuring the reflectivity of precipitation; and
- mechanical means for moving a measuring surface element in relation to the air and for measuring the amount of ice accumulated on
15 the surface element during a given period of time; and
- electronic means for combining said measurements.

22. An apparatus according to claim 21 and for the calculation of holdover time for anti-icing liquid, **characterised in** that it comprises a data storage for
20 storing information about empirical values for holdover time as a function of type of precipitation and the concentration of the anti-icing liquid.

23. An apparatus according to claim 21 or 22, **characterised in** that it comprises a mathematical model for estimating the ice deposition due to precipitation; and that the electronic means are configured for comparing the estimated values to the actually measured values for the amount of ice and for
25 adjusting parameters in the model for optimisation thereof.

24. An arrangement for predicting the risk of ice deposition due to precipitation,
30 **characterised in** that it comprises a number of apparatuses of the kind described in claims 21-23 that are arranged on different geographical loca-

tions and are configured for receiving meteorological information about the movement of air substances